

SERVICE MANUAL

FREE COMBI SERIES

FC-E24AI, FC-E28AI



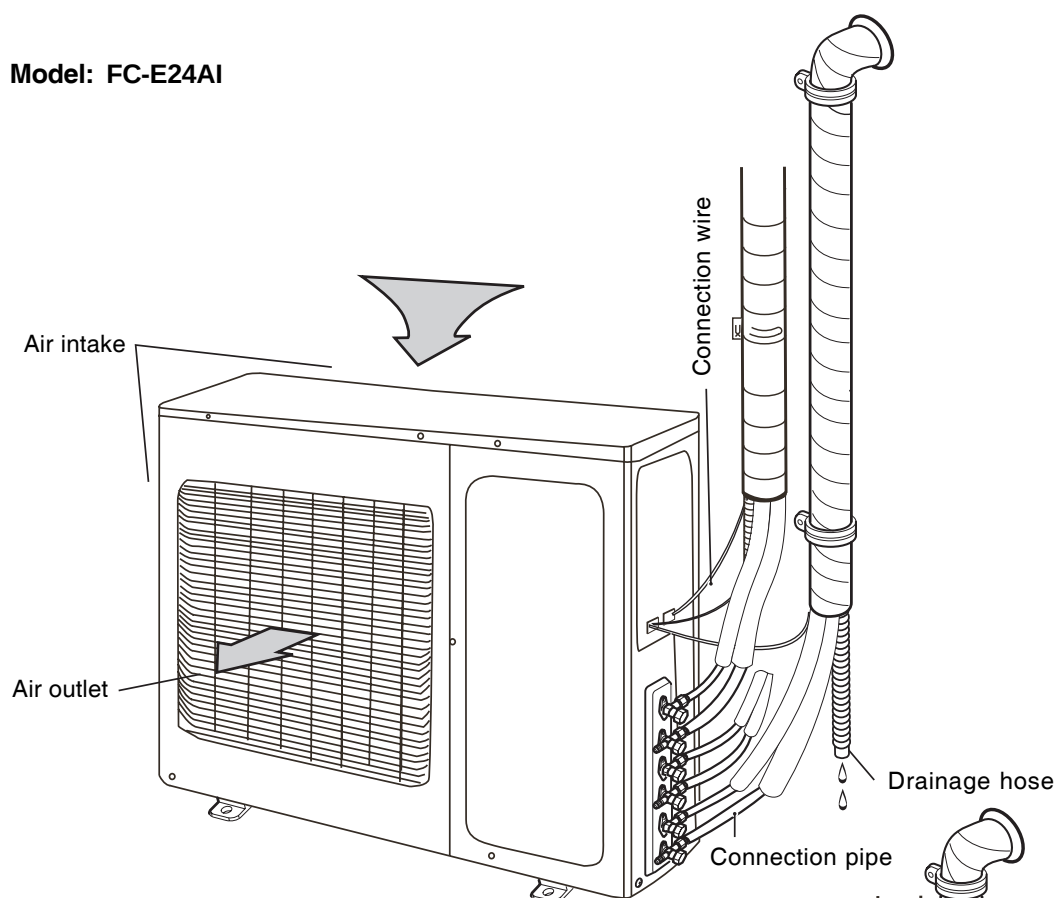
1. Technical specifications

Model	FC-E24AI	FC-E28AI
Compressor Manufacturer/trademark	Shenyang SANYO /SANYO	Shenyang SANYO /SANYO
Compressor Model	C-7RZ233H1A	C-7RZ233H1A
Compressor Type	Rotary	Rotary
L.R.A. (A)	34	34
Compressor RLA(A)	8.2	8.2
Compressor Power Input(W)	1760	1760
Overload Protector	1NT11L-3979	1NT11L-3979
Throttling Method	Electronic Expansion Valve	Electronic Expansion Valve
Starting Method	Transducer starting	Transducer starting
Working Temp Range (°C)	-7°C~T?43°C	-7°C~T?43°C
Condenser	Aluminum fin-copper tube	Aluminum fin-copper tube
Pipe Diameter (mm)	Φ9.52	Φ9.52
Rows-Fin Gap(mm)	2-1.4	2-1.4
Coil length(l) x height(H) x coil width(L)	806X813X44	806X813X44
Fan Motor Speed (rpm) (H/M/L)	860/760/540	860/760/540
Output of Fan Motor (W)	60	60
Fan Motor RLA(A)	0.3	0.3
Fan Motor Capacitor (uF)	3	3
Air Flow Volume of Outdoor Unit	/	/
Fan Type-Piece	Axial fan –1	Axial fan –1
Fan Diameter (mm)	460	460
Defrosting Method	Auto defrost	Auto defrost
Climate Type	T1	T1
Isolation	I	I
Moisture Protection	IP24	IP24
Permissible Excessive Operating Pressure for the Discharge Side(MPa)	3.8	3.8
Permissible Excessive Operating Pressure for the Suction Side(MPa)	1.2	1.2
Sound Pressure Level dB (A) (H/M/L)	60/54	60/54
Sound Power Level dB (A) (H/M/L)	69/68	69/68
Dimension (W/H/D) (mm)	950X840X420	950X840X420
Dimension of Package (L/W/H)(mm)	1100X450X905	1100X450X905
Net Weight /Gross Weight (kg)	75/80	75/80
Refrigerant Charge (kg)	R410a/3.3	R410a/3.3

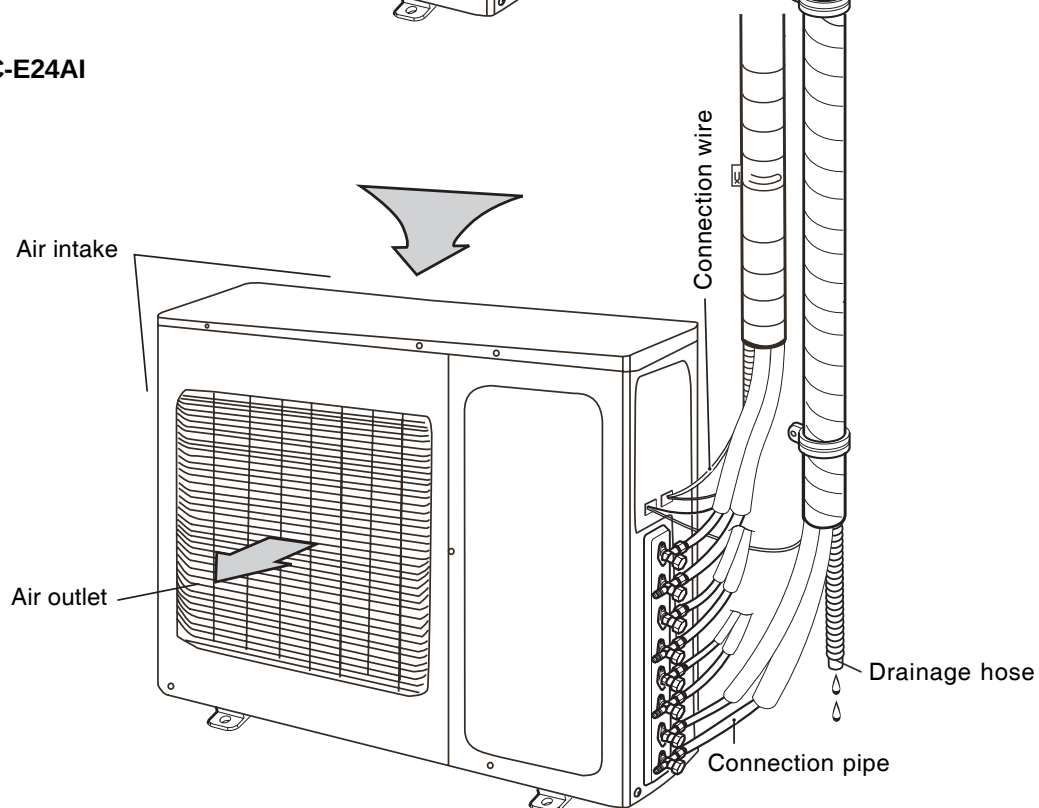
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2.Part name

Model: FC-E24AI

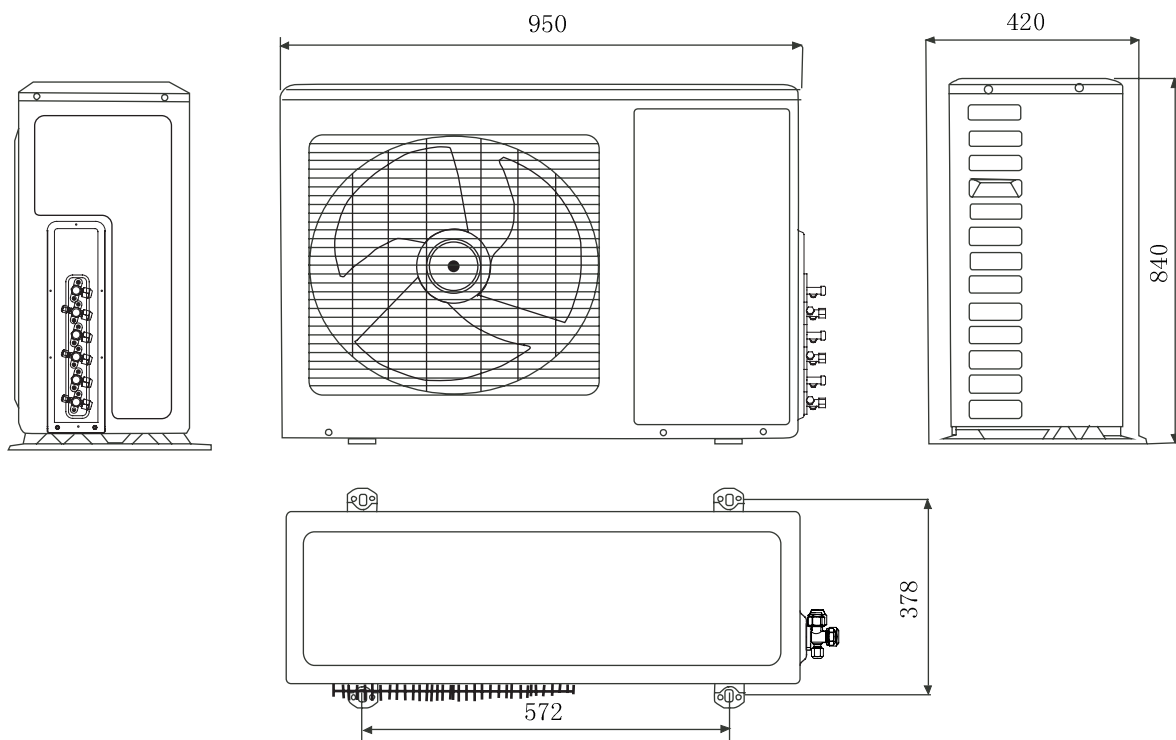


Model: FC-E24AI

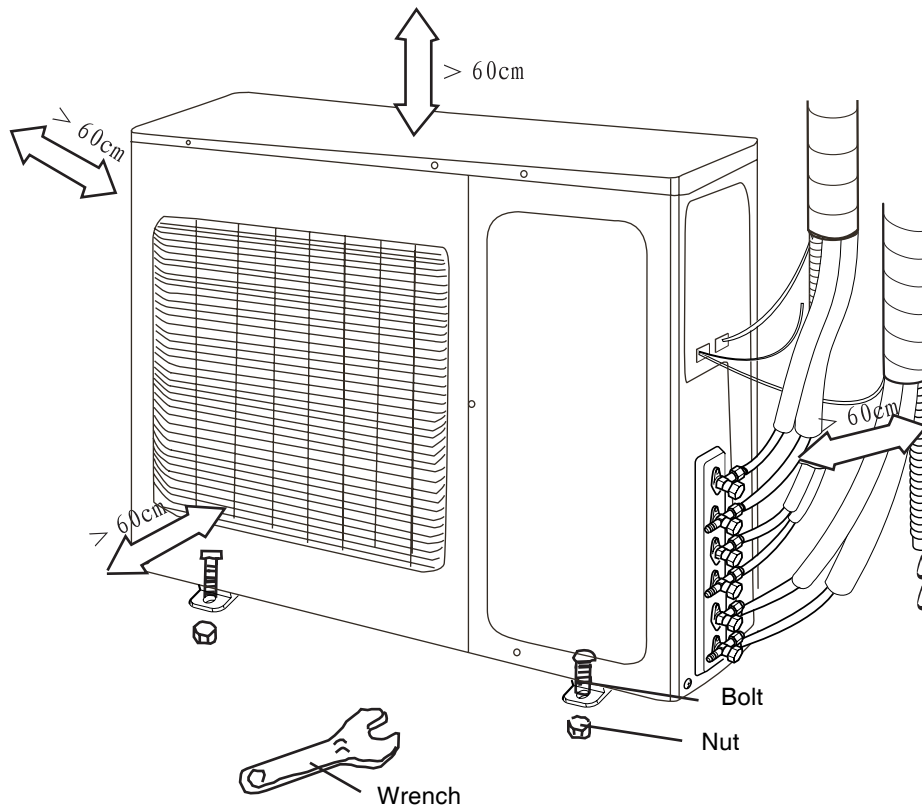


3.Outline and dimension

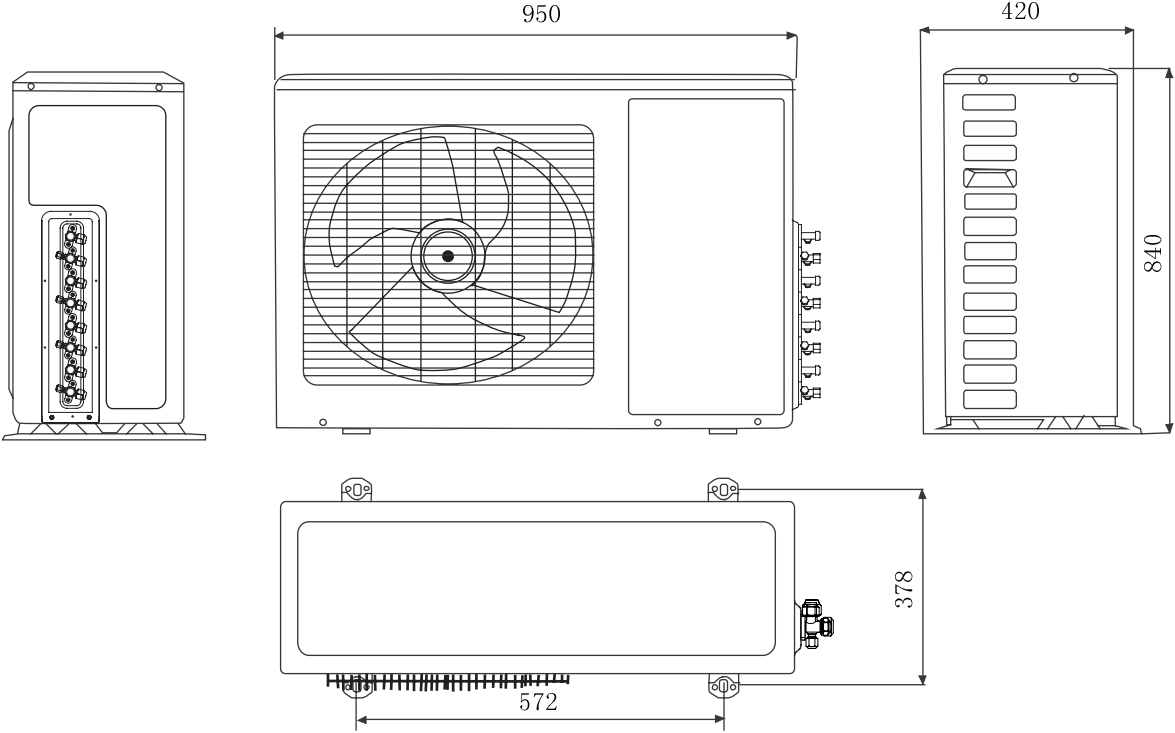
Model: FC-E24AI



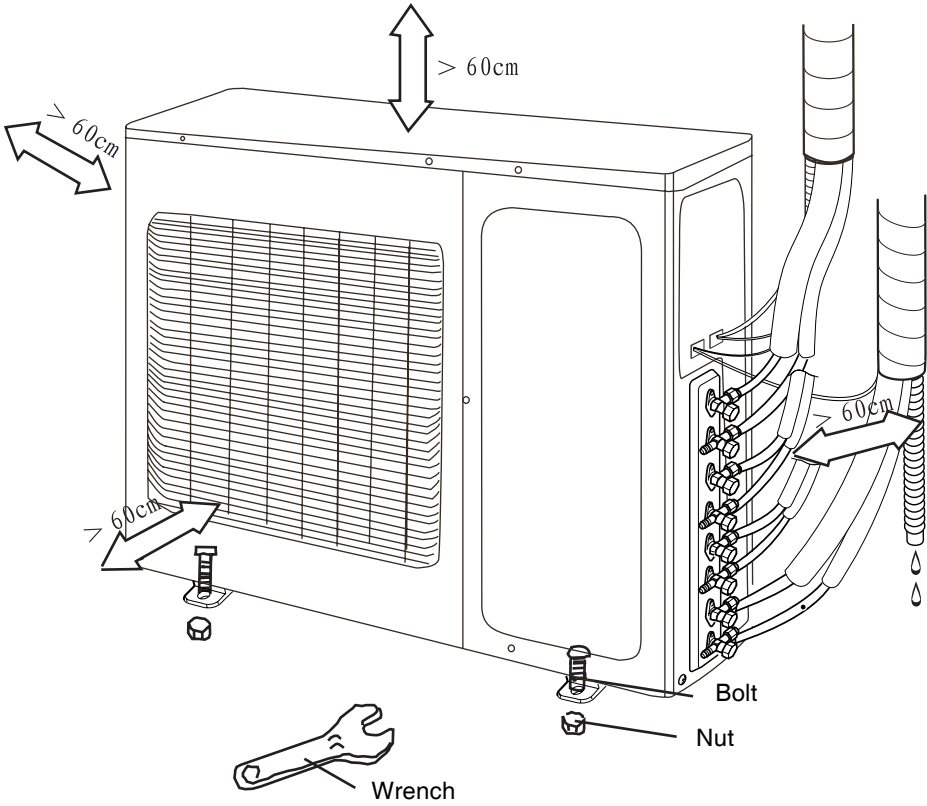
Unit: mm



Model: FC-E28AI

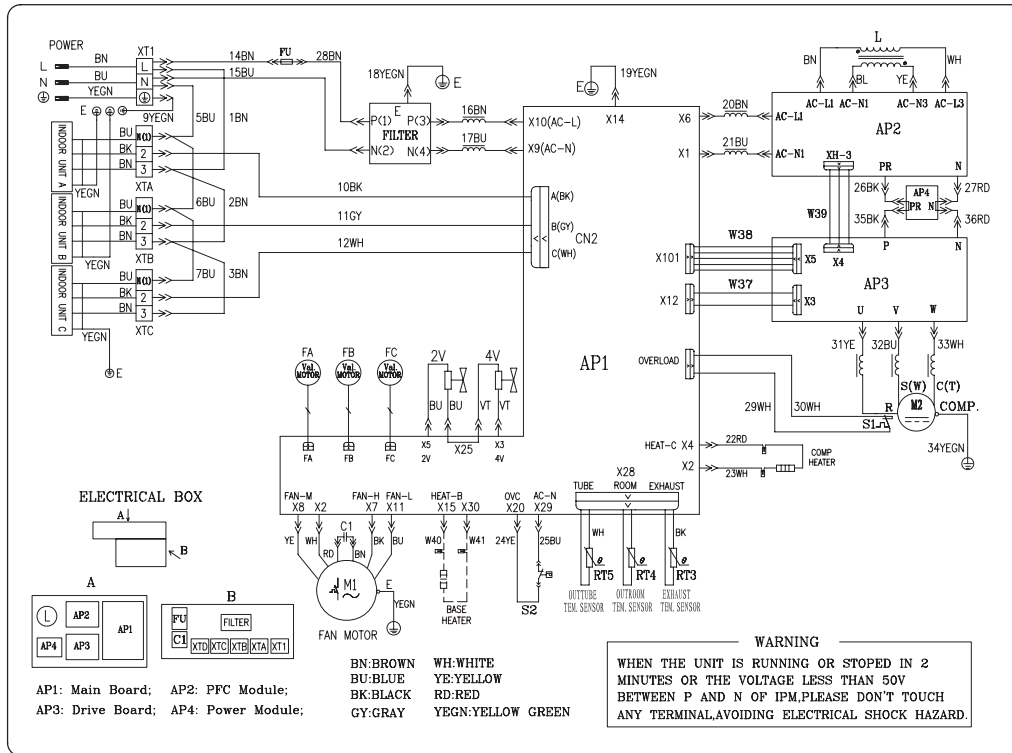


Unit: mm

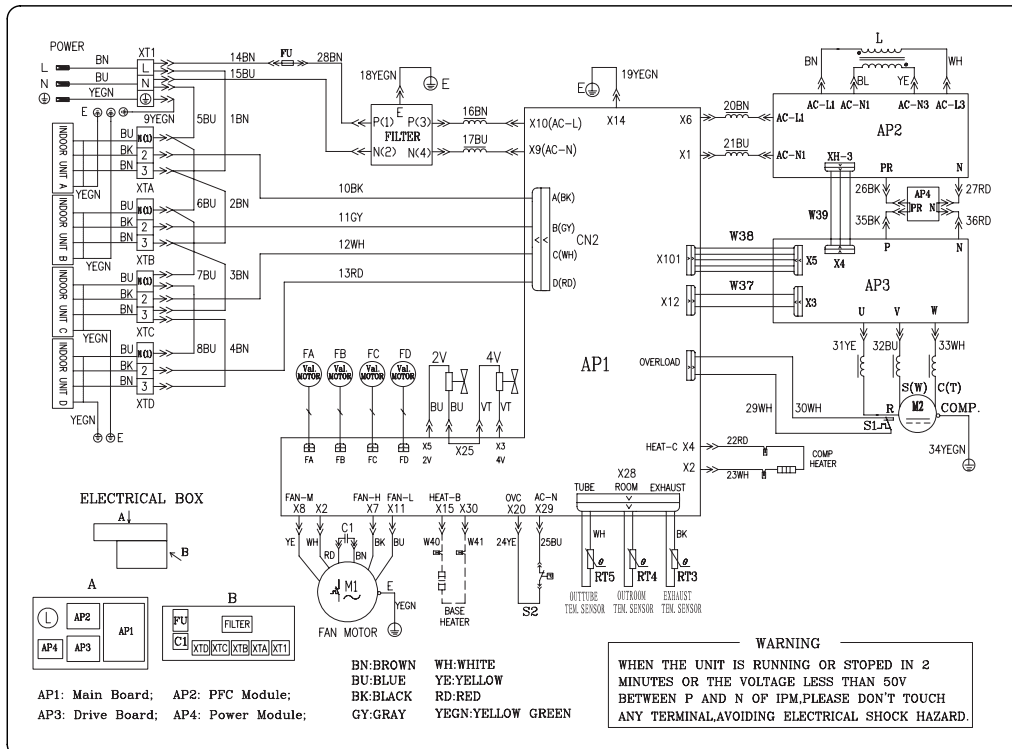


4. Wiring Diagram

Model: FC-E24AI



Model: FC-E28AI



These circuit diagrams are subject to change without notice, please refer to the one supplied with the unit.

5. Operation

1. Temperature parameters

- ◆ Indoor ambient temperature (T_{indoor amb})
- ◆ Indoor setting temperature (T_{set})

2. System first power on

After electrified, the side valve will be powered on, each electron expansion valve will be turned off orderly, then side valve will be powered off, all the electron expansion valve should be turned to a certain angle, the unit on is standby.

Under each modes, once the compressor starts up, at least running for 7mins the unit will stop (not including malfunction protection, modes switch the compressor needed to stop running);

Once compressor stopped, the unit will start up after 3mins delay (Heating oil return or defrosting except).

2.1 Cooling mode

2.1.1 Working condition and procedure of cooling running

If compressor stopped and turn on the unit for cooling, if any one indoor unit (T_{indoor amb} $\geq$ T_{preset}) - 0.5 °C, that the cooling will run; at this time, the outdoor fan motor, compressor starts to run, the compressor frequency will run at the capacity requirement calculated.

2.1.2 Unit will stop for cooling

(1) Compressor will stop running

Compressor will stop running right away, outdoor fan motor will delay 1min and will stop running, all the electron expansion valve starts to work, when turns off all valves at OP, the side valve will be electrified, the valve fully turns to 480P, the side valve will turn off.

(2) Part of indoor unit arrive at unit stop running condition (Compressor will not stop)

Compressor will run according to capacity requirement calculated frequency, when capacity requirement is 0 indoor unit corresponding electron expansion valve 5s turns off, compressor frequency variable start meanwhile running indoor unit (no matter it is newly opened or indoor unit has been run) the corresponding electron expansion valve resumes to the original value.

NOTE: Unit off, Fan, Protection as the same with Cool mode;

2.1.3 Switching from cooling mode to heating mode

When turning to heating mode, after compressor stopped, 4-way valve will electrify after 2mins delay, the others are the same with cooling.

2.1.4 4-way valve control

Under this mode, 4-way valve will close (that is not electrified).

2.1.5 Outdoor unit fan motor control under cooling mode

Before compressor start 5s start cooling, after outdoor fan motor start up and run in high speed for 3min, then according to the indoor unit rated capacity total amount and outdoor ambient temperature, automatically select High, Mid, Low three fan speeds.

Other control: When the newly opened indoor unit is running, outdoor fan motor will run at high fan speed for 40s, then according to control logic to adjust. Fan motor each grade at least run 80s (when indoor unit running quantities change and calculate indoor unit rated capacity total amount and according to temperature to adjust the fan speed.) When compressor stops running, outdoor fan will run at

When cooling oil return, after compressor frequency rise up to 70Hz, it will stayably run; Outdoor fan motor will accord to indoor unit will run at current fan speed and after 1min delay to stop.

2.1.6 Cooling oil return condition

rating capacity total capacity and temperature automatically adjust the fan speed.

The oil return lasting time of cooling will be 5min. (including frequency rising time), oil return will be completed.

2.1.7 Anti-freezing protection

When it is satisfied with anti-freezing protection, the system will enter into anti-freezing protection, at this time only some of the indoor unit anti-freezing protection, indoor capacity will be set as 0; when all running indoor unit act the anti-freezing protection, the unit will process as Cool mode. When it is satisfied with the anti-freezing protection finished, the anti-freezing protection will be finished.

2.2 Dehumidify mode

Working condition and procedure of dehumidifying: the same with Cool mode; Protection function: the same with Cool mode. Close up 4-way valve. The single unit capacity requirement percent of dehumidifying mode max. value is the cooling mode 90%, outdoor fan motor, compressor start up condition is the same with that in Cool mode.

2.3 Heating mode

2.3.1 Working condition and procedure of heating running

When any one of indoor unit T_{indoor amb} $\leq$ T_{preset} + 2.5 °C, will start heating mode (turns on the heating and arrive at the unit on temperature)

2.3.2 Unit will stop for heating

All indoor units arrived at unit off or unit stop condition: compressor will stop, outdoor fan unit will delay 1min will stop, all the elctrictron expansion valve will start to work, when all valves turn to OP adjustment, the side valve will electrified, when turn the valve to 480P, the side valve will not electrified.

2.3.3 Turns to Cooling (dehumidifying), Fan modes

Compressor stop running; four-way valve will delay 2min and powered off; outdoor fan will delay 1min and stop running; 4-way valve will electrified. All the expansion valve will turn to OP for adjustment, the side valve will electrify, the valve will fully turn to 480P, the side valve will power off.

2.3.4 Outdoor fan control

Heating start up and compressor start up before 5s running, after outdoor fan start up and run in high speed 80s, then according to indoor unit rated capacity total amount and outdoor ambient temperature will automatically select Hig, Mid, Low three fan speed.

Other control: newly open indoor unit for running, outdoor fan motor will run at high speed for 40s right away, then adjust according to control logic. Fan motor each speed runs 80s at least (Indoor unit running quantity changed, will calculate the total amount of indoor unit rated capacity and according to the temperature to adjust the fan speed.) When compressor stop running, outdoor fan motor will stop after 1min delay. When tout ambient $> 15^{\circ}\text{C}$ and indoor unit stop running or unit off, meanwhile the outdoor unit will stop running, 30s later, restart again.

2.3.5 Defrosting

When satisfied with defrosting condition, the system will enter into defrosting, at this time the compressor will stop running; All electron expansion valve will turn to 480P; after compressor stop 40s later, outdoor fan will stop, meanwhile the four-way valve will reversal; after 4-way valve reversed all electron expansion valve will turn to 150p, after expansion valve turned to preset position, compressor starts up and frequently run (frequency limit, frequency drop will be effective). When defrosting condition finished has been satisfied, defrosting will finish.

2.3.6 Heating oil return control

When heating running and produce oil return condition, then send the oil return signal to indoor unit, indoor unit will execute as oil return operation; Compressor will stop running, all electron expansion valve of indoor valve will turn to 480P (all electron expansion valve turns to 480P then side valve will turn on); Compressor stops 40s later, 4-way valve will reversed. Outdoor fan: Firstly run at high speed 40s (Before this, if low fan speed rotate to high fan speed 40s; At this time, if it run at high fan speed that will maintain high fan speed runs for 40s), 4-way valve reversed, all electron expansion valve will turn to 150P; Expansion valve will turn to preset position, the compressor will start up and runs at high frequency in a certain frequency.

When oil return maintain time arrives 5mins, will finish.

2.4 System protection function

2.4.1 Indoor unit modes conflict protection

If the preset of indoor unit is different, according to the following for running:

- Consider the first running indoor unit mode as the standard mode, other indoor units modes compared to this mode and judge whether there is conflict happened. Cool mode (Dehumidifying) conflicts with Heat mode.
- Fan mode conflicts with Heat mode, consider heating as the basic mode, no matter the sequence of units turns on, indoor units conflict, will run in heating mode.

2.4.2 Overload protection (Anti-high temperature protection)

When Ttube temperature is tested very low, compressor will run rise frequency; when the temperature is tested very high, the compressor will run at frequency limit or frequency drop; if Ttube is very high, compressor will stop running.

If the tube temperature overload protection 6 times continuously happened that the compressor cannot resume to run, it needs to power on then it can resume. During the operation, if compressor running time exceed 7mins, the overload protection times will clear to 0.

2.4.3 Air exhaust temperature protection

When detected the Tair exhaust is very high, frequency rise is forbidden; If detected the Tair exhaust is very high, compressor will run at drop frequency; If detected the Tair exhaust is too high and excessive, compressor will stop for 3mins, if Tair exhaust resume to normal that the compressor, outdoor fan will resume to run.

If the Tair exhaust temperature protection has continuously happened for 6 times that the compressor cannot resume. it needs to power on then can resume. (If compressor running time exceed 7mins, the protection times will clear to 0).

2.4.4 Communication malfunction

Indoor unit installation quantities test: after powered on, within 3mins, outdoor unit hasn't received the communication data from some indoor unit, that outdoor unit will judge this indoor unit haven't installed. Outdoor unit will not communicate with indoor unit.

Communication malfunction: when continuously 3mins hasn't received the correct signal of all the installed indoor unit or within 10s, cannot receive the correct signal from the drive board that are communication malfunction, the outdoor unit will stop running.

Communication malfunction happened during defrosting, will process as following: multi unit heating, defrosting break off start part of indoor unit communication wire, go on defrosting, until defrosting finished then make response to indoor unit communication malfunction.

2.4.5 Module protection

Compressor will stop when module protect, when indoor temperature arrive at presetting temperature, the unit will stop running, compressor has stopped 3mins, it will automatically resume to running status. (If in defrosting procedure, after 180s later that will resume); If the continuous protection times excess 6 times (if compressor running time excess 7min, that the protection times will clean to 0), the system will turn off the unit and sent wrong signal to outdoor unit, it cannot resume to running status; It is need to resume after powered on.

2.4.6 Compressor high pressure protection

If continuously 3s detected the high pressure switch break off, will treat as arrive at preset temperature point, unit will stop, meanwhile send the "High-pressure protection" signal to indoor unit; After the high-pressure malfunction happened, if continuously 6s detected the high pressure switch off, should turn power off and repower on, the whole unit can resume to work.

2.4.7 Compressor overload protection

If tested the compressor overload switch, according to indoor temperature arrive at preset temperature condition, unit will stop and display the corresponding malfunction, compressor has stopped 3mins above and the compressor overload switch reset, it will automatically resume to the running status. If protection times more than 6 times (if compressor continuously running time more than 7 mins, that the protection times will clear to 0) that cannot automatically resume, it should to turn the power off and repower again.

2.4.8 Compressor electric heating control

If outdoor ambient temperature is detected very low and compressor doesn't start up, the compressor electric heating start to work; If compressor start up or compressor doesn't start up, but the outdoor temperature is very high, then the electric heating will not to work.

2.4.9 Chassis electric heating (this function is optional, it could be added according to the customer required)

When outdoor ambient temperature is very low, condenser electric heating will start to work; when outdoor ambient temperature is very high, the condenser electric heating will not work. When entering into Defrosting, until defrosting finished, after compressor started up 3mins later, the indoor chassis electric heating will start to work, after compressor run 3mins and outdoor ambient temperature is very high, the electric heating will stop to work.

2.4.10 Sensor malfunction testing

- (1) At unit standby do not test the malfunction of outdoor tube sensor, ambient sensor;
- (2) Under Heat mode, compressor continuously run 3mins later, start to test the air exhaust sensor malfunction, under other modes for testing all along;
- (3) Under Heating mode, compressor start up within 10mins, after Defrosting, Heating oil return later within 10mins, do not test outdoor tube sensor malfunction;
- (4) After other outdoor sensor turned on, test the malfunction right away, outdoor each sensor continuously test 30s;
- (5) After the sensor malfunction has been tested, stop the unit right away.

2.5 Malfunction indicator

Model: FC-E24AI

Meanings of malfunction indicator for outdoor -unit main board(AP1) and drive board(AP3)

LED-D101(red)	Name of malfunction	LED-D102(yellow)	Name of malfunction	LED-D103(green)	Name of malfunction
flash-1 time	Compressor runs	flash-1 time	Frequency drop for exhaust protection	flash-1 time	Frequency limit for exhaust protection
flash-2 times	Stop for compressor high-pressure protection	flash-2 times	Frequency drop for cooling overbad	flash-2 times	Frequency limit for cooling overbad
flash-3 times	Stop for exhaust protection	flash-3 times	Frequency drop for over current protection	flash-3 times	Frequency limit for over current protection
flash-4 times	Stop for communication malfunction(including indoor unit and SIPM)	flash-4 times	Frequency drop for phase current protection	flash-4 times	Frequency limit for phase current protection
flash-5 times	Stop for IPM module protection	flash-5 times	Frequency drop for heating unit B high temperature protection	flash-5 times	Frequency limit for heating unit A high temperature protection
flash-6 times	Stop for over current protection	flash-6 times	Frequency drop for heating unit B high temperature protection	flash-6 times	Frequency limit for heating unit B high temperature protection
flash-7 times	Stop for cooling overbad	flash-7 times	Frequency drop for heating unit C high temperature protection	flash-7 times	Frequency limit for heating unit C high temperature protection
flash-8 times	Stop for high temperature protection of each indoor unit simultaneously		Defrost	flash-9 times	Oil return
flash-9 times	Stop for anti-freezing protection of each indoor unit simultaneously				
flash-10 times	Stop for outdoor unit sensor malfunction or sensor malfunction of each indoor unit simultaneously				
flash-11 times	Stop for compressor overload protection				
flash-12 times	Stop for compressor low-pressure protection(prepared)				
flash-13 times	Stop for phase current protection				
flash-14 times	Stop for incorrect read of E2PROM				
flash-15 times	Short circuit of DC power supply				
LED-D104(red)	Name of malfunction	LED-D105(yellow)	Name of malfunction	LED-D106(green)	Name of malfunction
flash-1 time	Outdoor ambient sensor malfunction	flash-1 time	Unit A communication malfunction(not available to receive correct data from A in 3 min.)	flash-1 time	Unit B communication malfunction(not available to receive correct data from B in 3 min.)
flash-2 times	Outdoor tube sensor malfunction				
flash-3 times	Outdoor exhaust sensor malfunction	flash-2 times	Unit A indoor middle sensor malfunction	flash-2 times	Unit B indoor middle sensor malfunction
flash-4 times	Communication with drive board malfunction (not available to receive correct data in 10s)	flash-3 times	Unit A indoor outlet pipe sensor malfunction	flash-3 times	Unit B indoor outlet pipe sensor malfunction
		flash-4 times	Unit A indoor inlet pipe sensor malfunction	flash-4 times	Unit B indoor inlet pipe sensor malfunction
		flash-5 times	Unit A indoor ambient sensor malfunction	flash-5 times	Unit B indoor ambient sensor malfunction
		flash-6 times	Mode conflict of Unit A	flash-6 times	Mode conflict of Unit B
		flash-7 times	Unit A anti-freezing protection	flash-7 times	Unit B anti-freezing protection
		flash-8 times	Unit A high temperature protection	flash-8 times	Unit B high temperature protection
LED-D107(red)	Name of malfunction				
flash-1 time	Unit C communication malfunction(not available to receive correct data from C in 3 min.)				
flash-2 times	Unit C indoor middle sensor malfunction	LED-D109(green)	Name of malfunction	LED1(red)	Name of malfunction
flash-3 times	Unit C indoor outlet pipe sensor malfunction	flash-1 time	Flash once after receiving correct communication data	flash-1 time	Compressor normally runs
flash-4 times	Unit C indoor inlet pipe sensor malfunction			flash-2 times	Stop for abnormality
flash-5 times	Unit C indoor ambient sensor malfunction			flash-3 times	IPM protection
flash-6 times	Mode conflict of Unit C	LED2(green)	Name of malfunction	flash-4 times	Demagnetization protection
flash-7 times	Unit C anti-freezing protection	flash-1 time	Communication failure(not available to receive date in 10s)	flash-5 times	PFC protection
flash-8 times	Unit C high temperature protection	flash-2 times	Normal communication	flash-6 times	Startup for 5 successive times
⊙ AP2 AP1 AP4 AP3 ELECTRICAL BOX AP1:Main Board; AP2:PFC Module; AP3:Drive Board; AP4:Power Module; <td></td> <td></td> <td>flash-7 times</td> <td>Startup failure</td>				flash-7 times	Startup failure
				flash-8 times	DC bus volt. is under 350V during startup of compressor
				flash-9 times	DC bus volt. is above 420V
				flash-10 times	IPM over heat protection
				flash-11 times	DC bus volt. is under 320V during running
		flash-12 times	IPM temperature detects short or open circuit of resistance		

Note:D101-D109,LED1 and LED2 are all indicators for malfunction, in which D101-D109 are on main board AP1, and LED1 and LED2 are on drive board AP3.

Model: FC-E28AI

Meanings of malfunction indicator for outdoor -unit main board(AP1) and drive board(AP3)

LED-D101(red)	Name of malfunction	LED-D102(yellow)	Name of malfunction	LED-D103(green)	Name of malfunction
flash-1 time	Compressor runs	flash-1 time	Frequency drop for exhaust protection	flash-1 time	Frequency limit for exhaust protection
flash-2 times	Stop for compressor high-pressure protection	flash-2 times	Frequency drop for cooling overload	flash-2 times	Frequency limit for cooling overload
flash-3 times	Stop for exhaust protection	flash-3 times	Frequency drop for over current protection	flash-3 times	Frequency limit for over current protection
flash-4 times	Stop for communication malfunction(including indoor unit and SIPM)	flash-4 times	Frequency drop for phase current protection	flash-4 times	Frequency limit for phase current protection
flash-5 times	Stop for IPM module protection	flash-5 times	Frequency drop for heating unit A high temperature protection	flash-5 times	Frequency limit for heating unit A high temperature protection
flash-6 times	Stop for over current protection	flash-6 times	Frequency drop for heating unit B high temperature protection	flash-6 times	Frequency limit for heating unit B high temperature protection
flash-7 times	Stop for cooling overload	flash-7 times	Frequency drop for heating unit C high temperature protection	flash-7 times	Frequency limit for heating unit C high temperature protection
flash-8 times	Stop for high temperature protection of each indoor unit simultaneously	flash-8 times	Frequency drop for heating unit D high temperature protection	flash-8 times	Frequency limit for heating unit D high temperature protection
flash-9 times	Stop for anti-freezing protection of each indoor unit simultaneously	flash-9 times	Defrost	flash-9 times	Oil return
flash-10 times	Stop for outdoor unit sensor malfunction or sensor malfunction of each indoor unit simultaneously				
flash-11 times	Stop for compressor overload protection				
flash-12 times	Stop for compressor low-pressure protection(prepared)				
flash-13 times	Stop for phase current protection				
flash-14 times	Stop for incorrect read of EEPROM	LED-D105 (yellow)	Name of malfunction	LED-D106(green)	Name of malfunction
flash-15 times	Short circuit of DC power supply	flash-1 time	Unit A communication malfunction(not available to receive correct data from A in 3 min.)	flash-1 time	Unit B communication malfunction(not available to receive correct data from B in 3 min.)
		flash-2 times	Unit A indoor middle sensor malfunction	flash-2 times	Unit B indoor middle sensor malfunction
LED-D104(red)	Name of malfunction	flash-3 times	Unit A indoor outlet pipe sensor malfunction	flash-3 times	Unit B indoor outlet pipe sensor malfunction
flash-1 time	Outdoor ambient sensor malfunction	flash-4 times	Unit A indoor inlet pipe sensor malfunction	flash-4 times	Unit B indoor inlet pipe sensor malfunction
flash-2 times	Outdoor tube sensor malfunction	flash-5 times	Unit A indoor ambient sensor malfunction	flash-5 times	Unit B indoor ambient sensor malfunction
flash-3 times	Outdoor exhaust sensor malfunction	flash-6 times	Mode conflict of Unit A	flash-6 times	Mode conflict of Unit B
flash-4 times	Communication with drive board malfunction (not available to receive correct data in 10s)	flash-7 times	Unit A anti-freezing protection	flash-7 times	Unit B anti-freezing protection
		flash-8 times	Unit A high temperature protection	flash-8 times	Unit B high temperature protection
LED-D107(red)	Name of malfunction	LED-D108(yellow)	Name of malfunction	LED-D109(green)	Name of malfunction
flash-1 time	Unit C communication malfunction(not available to receive correct data from C in 3 min.)	flash-1 time	Unit D communication malfunction(not available to receive correct data from D in 3 min.)	flash-1 time	Flash once after receiving correct communication data
flash-2 times	Unit C indoor middle sensor malfunction	flash-2 times	Unit D indoor middle sensor malfunction	LED1(red)	Name of malfunction
flash-3 times	Unit C indoor outlet pipe sensor malfunction	flash-3 times	Unit D indoor outlet pipe sensor malfunction	flash-1 time	Compressor normally runs
flash-4 times	Unit C indoor inlet pipe sensor malfunction	flash-4 times	Unit D indoor inlet pipe sensor malfunction	flash-2 times	Stop for abnormality
flash-5 times	Unit C indoor ambient sensor malfunction	flash-5 times	Unit D indoor ambient sensor malfunction	flash-3 times	IPM protection
flash-6 times	Mode conflict of Unit C	flash-6 times	Mode conflict of Unit D	flash-4 times	Demagnetization protection
flash-7 times	Unit C anti-freezing protection	flash-7 times	Unit D anti-freezing protection	flash-5 times	PFC protection
flash-8 times	Unit C high temperature protection	flash-8 times	Unit D high temperature protection	flash-6 times	Startup for 5 successive times
				flash-7 times	Startup failure
				flash-8 times	DC bus volt. is under 350V during startup of compressor
				flash-9 times	DC bus volt. is above 420V
		LED2(green)	Name of malfunction	flash-10 times	IPM over heat protection
		flash-1 time	Communication failure(not available to receive date in 10s)	flash-11 times	DC bus volt. is under 320V during running
		flash-2 times	Normal communication	flash-12 times	IPM temperature detects short or open circuit of resistance



Note: D101-D109, LED1 and LED2 are all indicators for malfunction, in which D101-D109 are on main board AP1, and LED1 and LED2 are on drive board AP3.

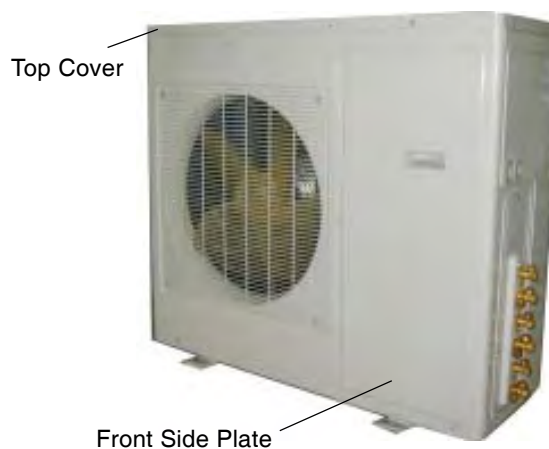
1.FC-E24AI

Operating Procedures / Photos

1.Disassemble Top Cover, Front Side Plate

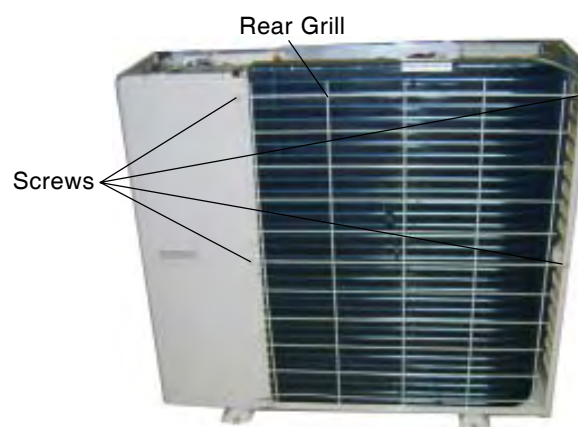
Unscrew the screws fixing the top cover, and then lift the top cover to remove it.

Unscrew the screws fixing the front side plate to remove it.



2.Disassemble Rear Grill

Unscrew the 4 screws fixing the rear grill to remove it.



3.Disassemble Cabinet

Unscrew the screws fixing the cabinet to remove it.



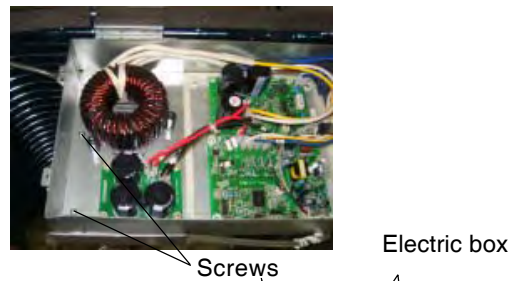
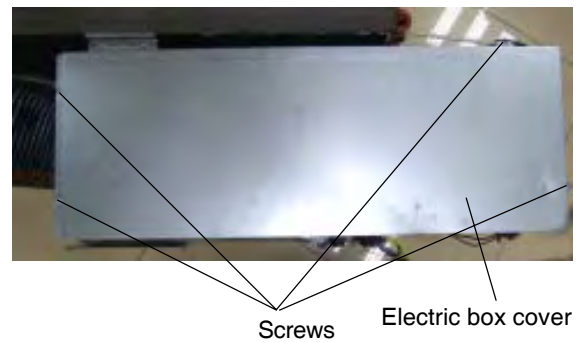
4. Disassemble Right Side Plate

Unscrew the screws at the right side plate, the valve support and the side plate of the condenser to remove the right Side Plate.



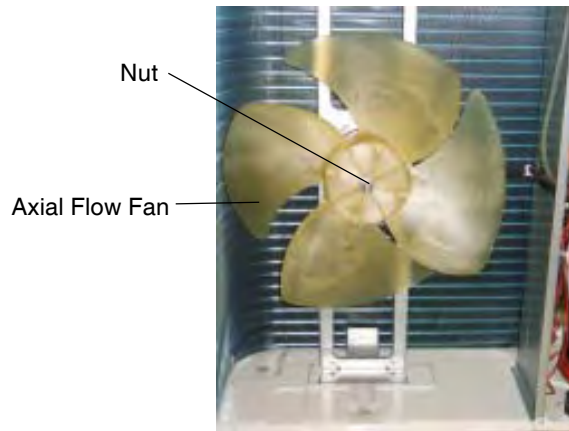
5. Disassemble the electric box

Unscrew the 4 screws fixing the electric box cover to remove the electric box cover. And then unscrew the 4 screws fixing the electric box, Pull each lead wire from the electric box, remove the electric box.



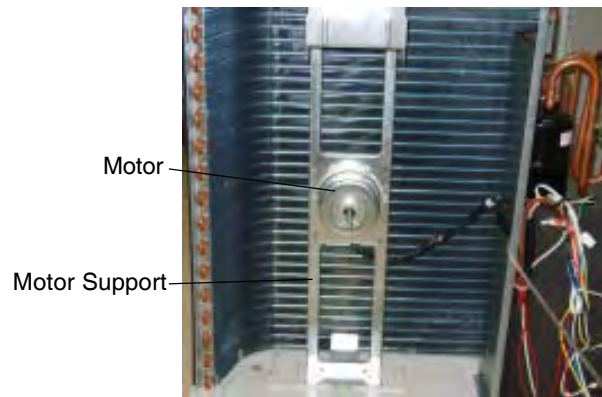
6. Disassemble the axial flow fan

Unscrew the nut fixing the fan with a spanner to take out the fan.



7. Disassemble Motor

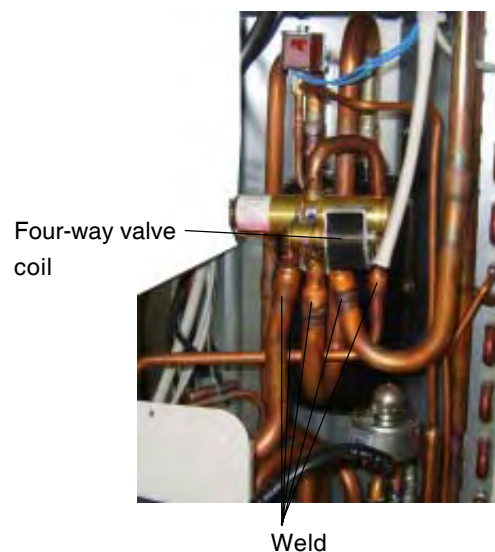
Unscrew the screws fixing the motor support, and then lift it upwards to remove it. Unscrew the screws fixing the motor to remove it.



8. Disassemble Four-way Valve

Wrap the four-way valve with wet cotton and unsolder the 4 weld connecting the four-way valve to take it out.

Note: Refrigerant should be discharged firstly. Welding process should be as quick as possible and keep wrapping cotton wet all the time. Be sure not to burn out the lead-out wire of compressor.

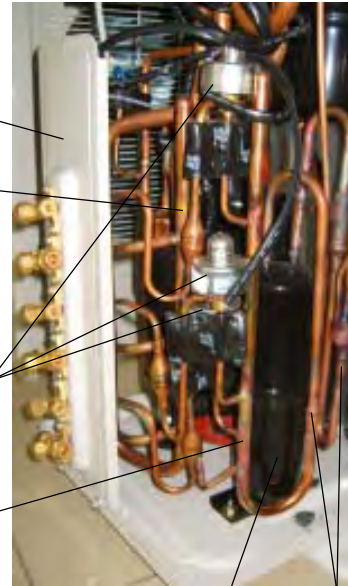


9. Disassemble valve support sub-assy, bidirectional liquid storage tank (valve support sub-assy should include gas, liquid valves, valve support, air collective pipe, electric magnetic expansion valve, diffuence pipe)

Unscrew the bolts which fixed the valve support, unsolder the soldered points on bidirectional liquid storage tank, take off the valve support sub-assy (the air collective pipe is connected with 4-way valve).

Electric magnetic expansion valve

Diffuence pipe



Bidirectional liquid storage tank Soldered points

10. Disassemble Compressor

Open the soundproofing cotton, Unsolder the pipe-line connecting the compressor, and then unscrew the 3 foot-nuts fixing compressor to remove it.

Gas-Liquid Separator

Weld

Soundproofing Cotton

Silencer

Compressor



2. FC-E28AI

Operating Procedures / Photos

1. Disassemble Top Cover, Front Side Plate

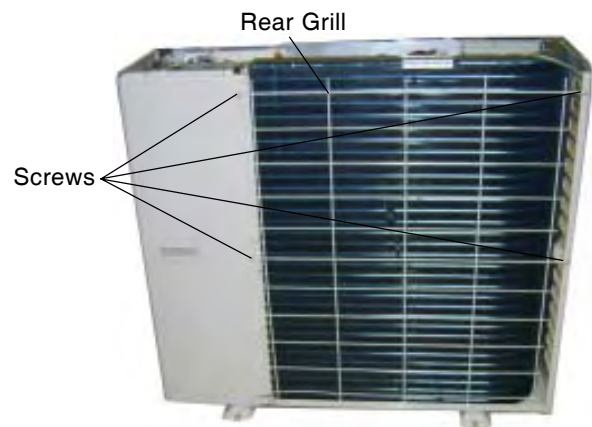
Unscrew the screws fixing the top cover, and then lift the top cover to remove it.

Unscrew the screws fixing the front side plate to remove it.



2. Disassemble Rear Grill

Unscrew the 4 screws fixing the rear grill to remove it.



3. Disassemble Cabinet

Unscrew the screws fixing the cabinet to remove it.



4. Disassemble Right Side Plate

Unscrew the screws at the right side plate, the valve support and the side plate of the condenser to remove the right Side Plate.

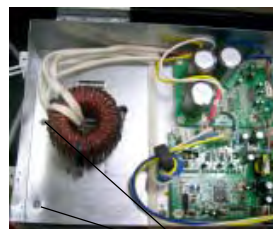


5. Disassemble the electric box

Unscrew the 4 screws fixing the electric box cover to remove the electric box cover. And then unscrew the 4 screws fixing the electric box, pull out each lead wire from the electric box, remove the electric box.



Screws Electric box cover



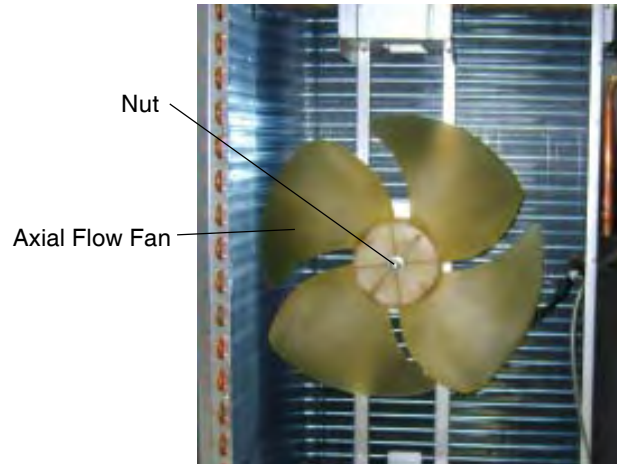
Screws

Electric box



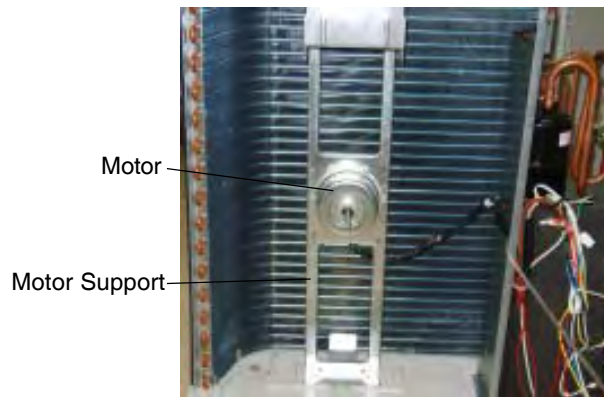
6. Disassemble the axial flow fan

Unscrew the nut fixing the fan with a spanner to take out the fan.



7. Disassemble Motor

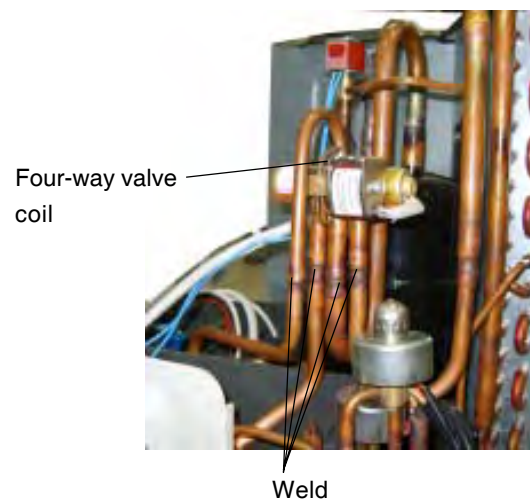
Unscrew the screws fixing the motor support , and then lift it upwards to remove it. Unscrew the screws fixing the motor to remove it.



8. Disassemble Four-way Valve

Wrap the four-way valve with wet cotton and unsolder the 4 weld connecting the four-way valve to take it out.

Note: Refrigerant should be discharged firstly. Welding process should be as quick as possible and keep wrapping cotton wet all the time. Be sure not to burn out the lead-out wire of compressor.

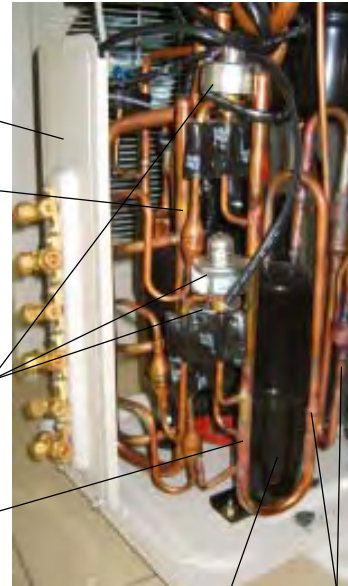


9. Disassemble valve support sub-assy, bidirectional liquid storage tank (valve support sub-assy should include gas, liquid valves, valve support, air collective pipe, electric magnetic expansion valve, diffuence pipe)

Unscrew the bolts which fixed the valve support, unsolder the soldered points on bidirectional liquid storage tank, take off the valve support sub-assy (the air collective pipe is connected with 4-way valve).

Electric magnetic expansion valve

Diffuence pipe



Bidirectional liquid storage tank Soldered points

10. Disassemble Compressor

Open the soundproofing cotton, Unsolder the pipe-line connecting the compressor, and then unscrew the 3 foot-nuts fixing compressor to remove it.

Gas-Liquid Separator

Weld

Soundproofing Cotton

Silencer

Compressor



Nut

1.General use part Notice

1. Preparations before Repair

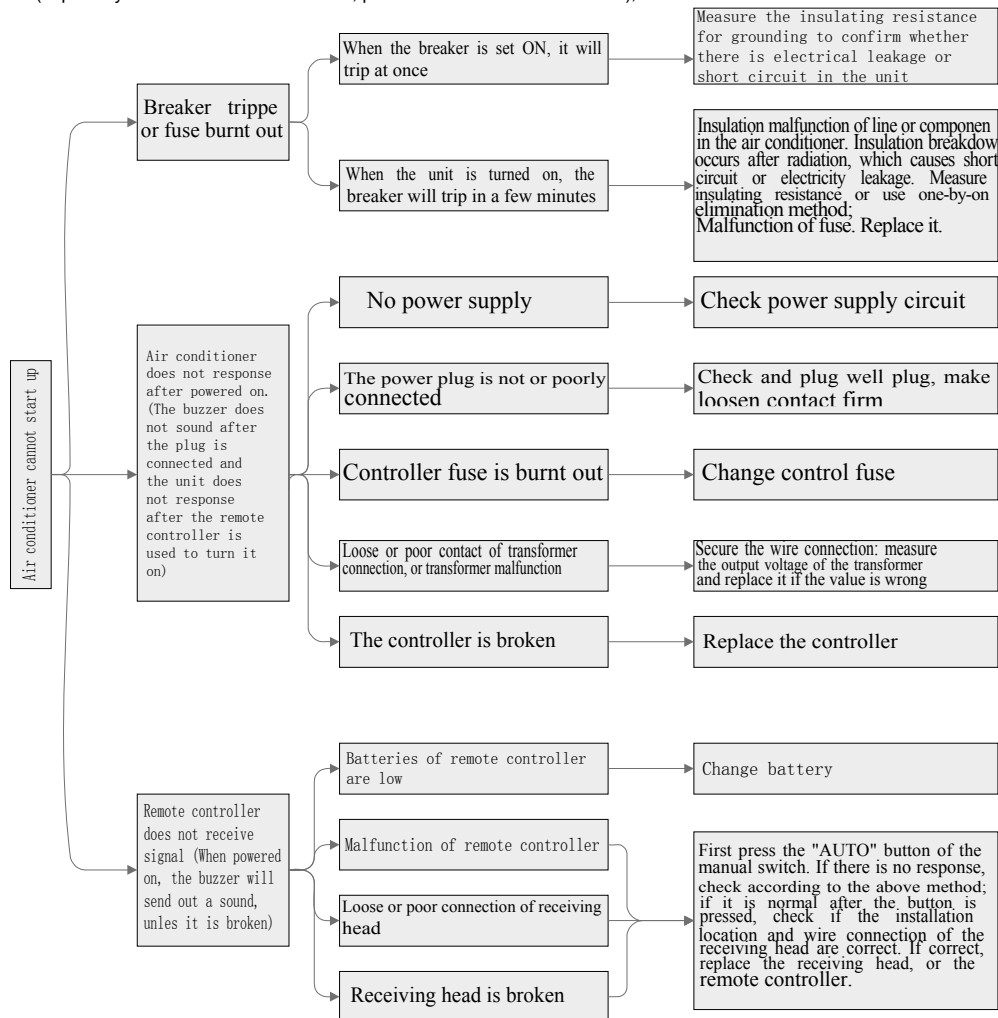
Step 1: Firstly, determine the model of unit to be repaired and find out the model and material code of the main damageable components, particularly the outdoor controller.

Step 2: According to the fault described by the user, make a preliminary judgment on the possible components that might be repl. Bring them with you for repair.

Step 3: To repair the VF unit, you need to bring with you the multimeter and clamp-on ammeter except the usual tools as screwdriver and spanner.

2.To avoid electric shock during repair, do not touch any terminal before it is measured that the voltage between module P and N is less than 50V.

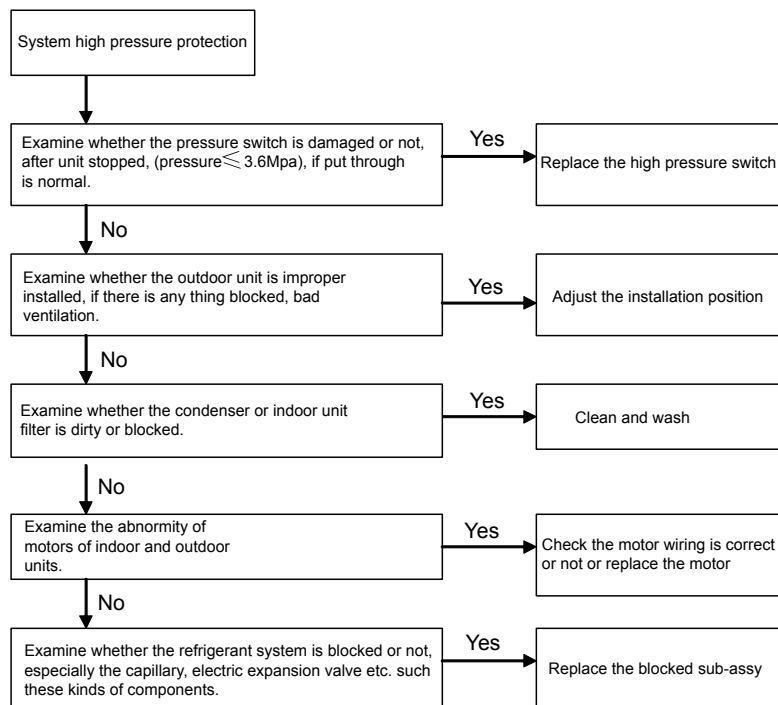
3.Before or after the maintenance, should examine the the user power socket, wiring board of indoor or outdoor unit, there are all insert pieces on the mainboard (especially the outdoor unit mainboard, power module and PFC module), whether loosen or not.



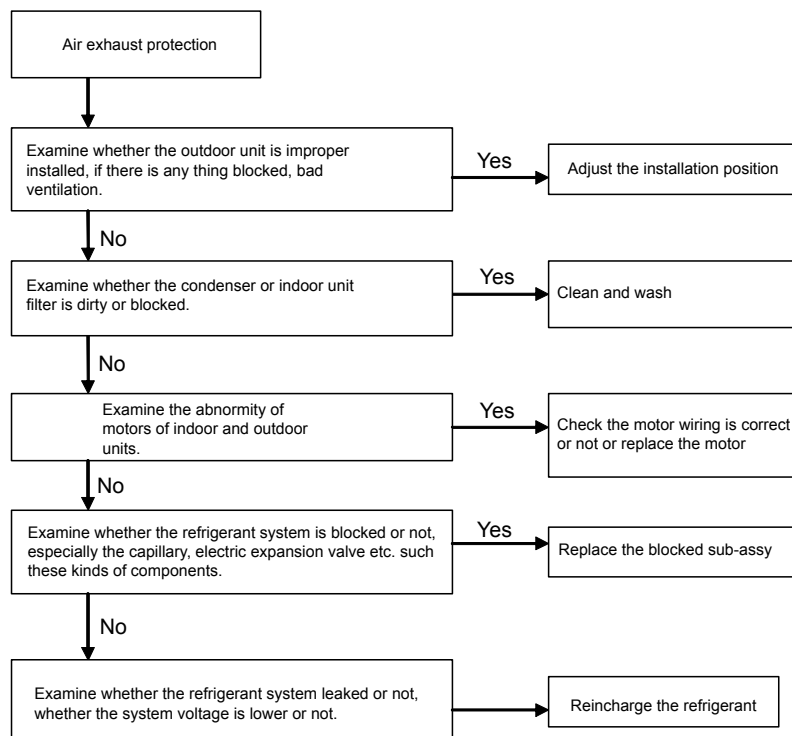
2. Malfunction display part

When AC having malfunction or protection, indoor unit displayer or indicator will display the corresponding codes, indicator on outdoor unit mainboard also display, the detailed contents has been discribed pls refer to the prior function part for more information, when protection or malfunction removed and display resume to normal. Partly display malfunction analysis or processing:

System high pressure protection E1 or running indicator extinguish 3s and blinks one time

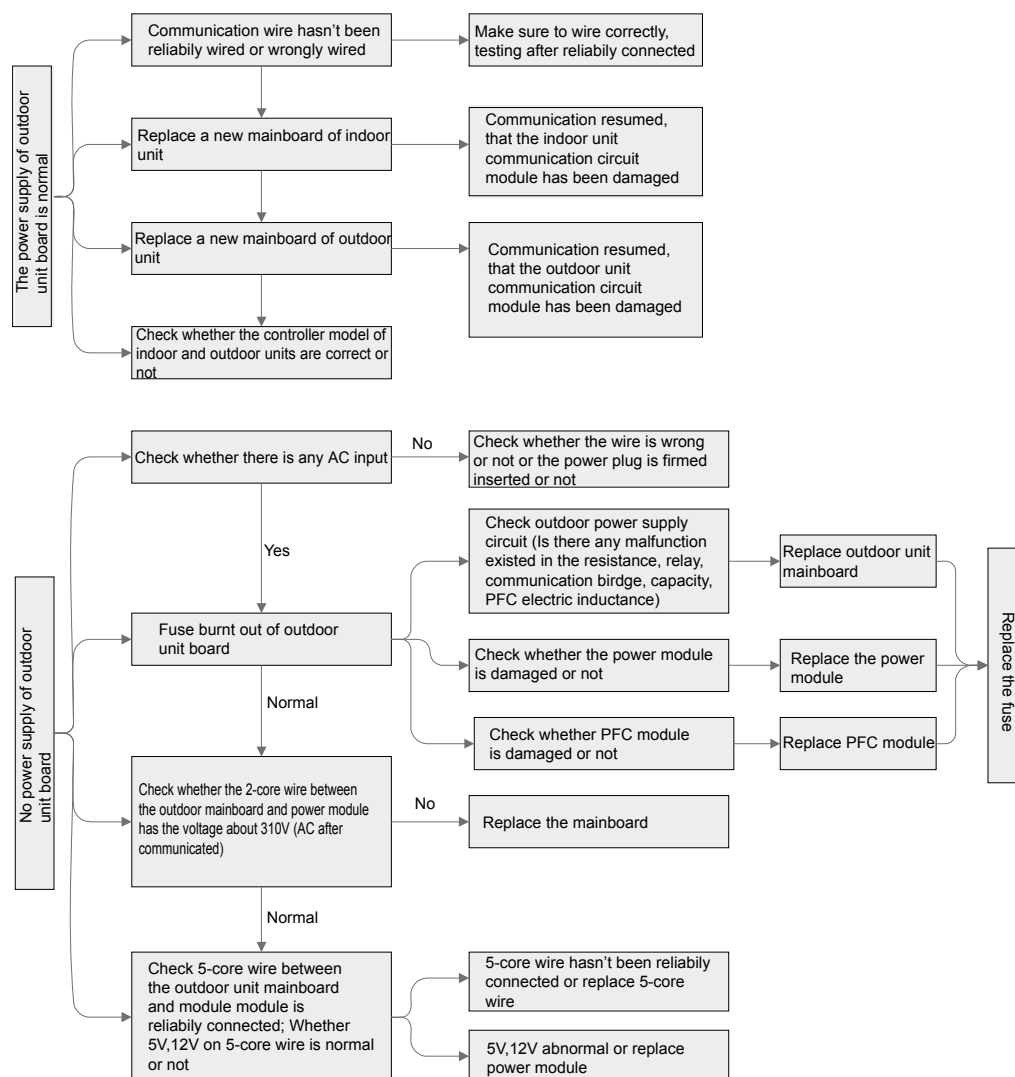


Compressor air exhaust protection E4 or running indicator extinguish 3s blinks 4 times



Communication malfunction E6 or running indicator extinguish 3s and blinks 6 times

- Cause: communication wire hasn't been reliably wired or wrongly wired; Indoor unit mainboard communication circuit module malfunction; Outdoor unit communication circuit module malfunction; abnormal power supply of outdoor unit or outdoor unit mainboard hasn't AC current input due to fuse burnt out.
- Processing method:



Compressor overload protection H3 or heating indicator extinguish 3s and blinks 3s

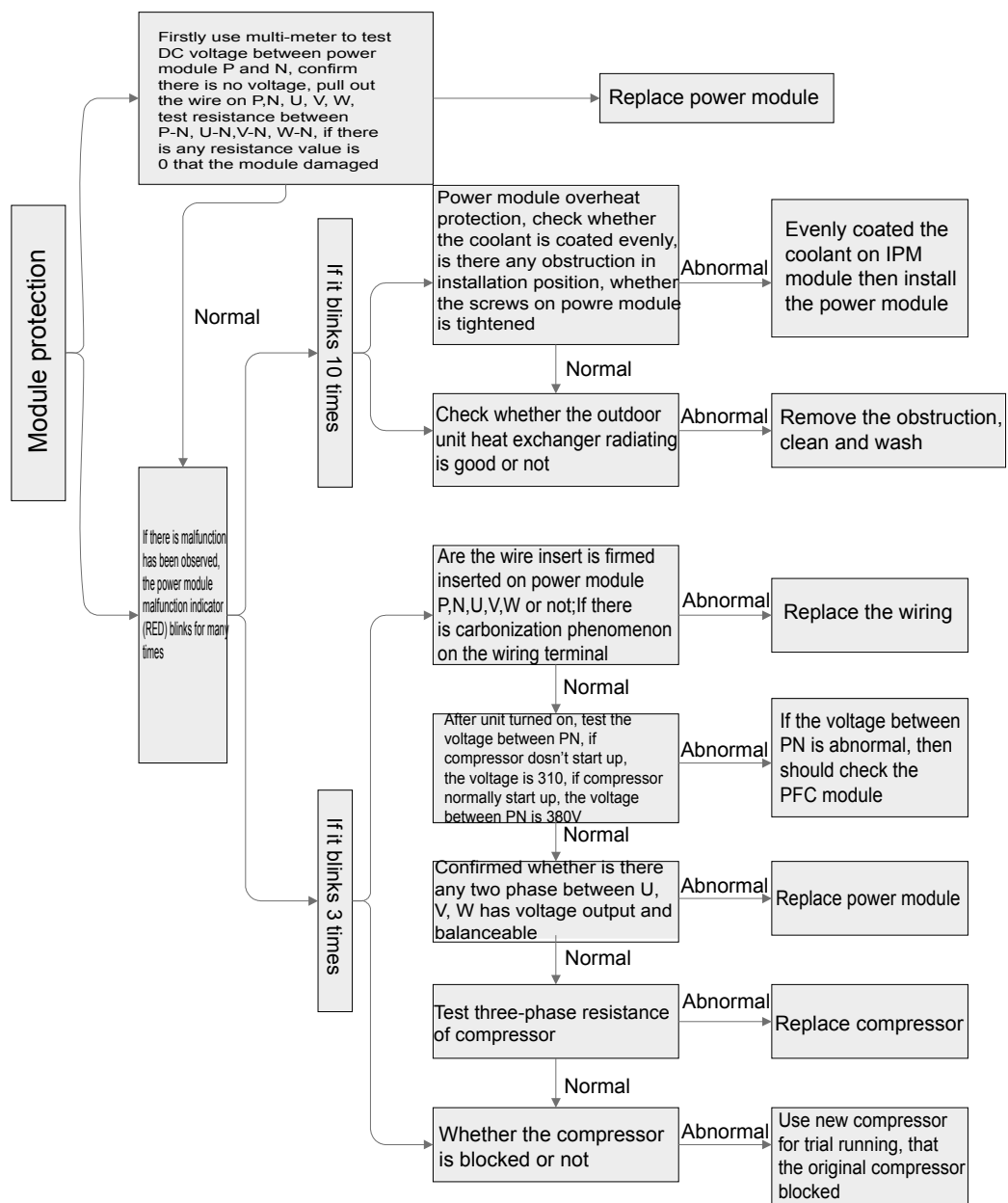
- Cause: Refrigerant is shortage or overfull; poor running of compressor; axes clasp or blocked, air exhaust valve damaged; protector malfunction.
- Processing method: Adjust coolant volume; Replace compressor; Use multi-meter check whether the contact of protector dredge, if not, replace the protector.

System abnormal H4 or heating indicator extinguish 3s blinks 4 times

- Overload protection, the protection when tube temperature (in Cool mode, test outdoor heat exchanger temperature, in Heat mode, test indoor heat exchanger temperature) is very high.
- Cause: In Cool mode, outdoor temperature is too high; Shortage of outdoor air volume; Refrigerant flow problem.
- Processing method: Pls refer to the Troubleshooting of prior part.

Module protection H5 or Heating indicator extinguish 3s blinks 5 times

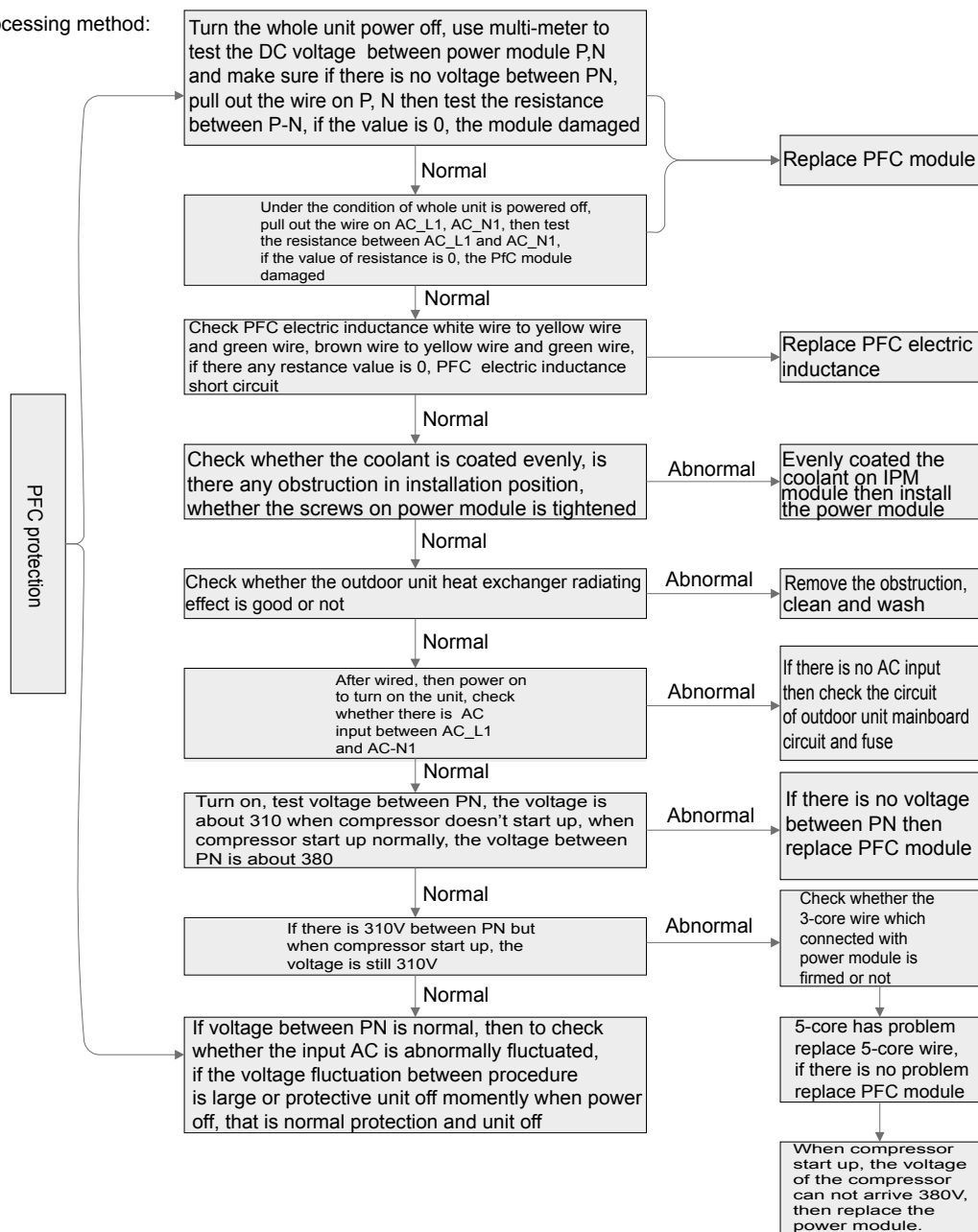
- Processing method:



PFC protection HC or Heating indicator extinguish 3s blinks 6 times

- Cause: Voltage change suddenly, poor radiating of Pfc module, connection wire (PFC control wire) between power module and PFC module is poor connected, over current ect.

- Processing method:



Temperature sensor F1, F2, F3,F4,F5 or cooling indicator extinguish 3s blink once, extinguish 3s blink twice, extinguish 3s and blink three times, extinguish 3s and blink four times, extinguish 3s and blink five times.

- Processing method: Pls check whether the resistance value of corresponding sensor is normal or not; Reliably inserted or not; Lead wire damaged or not; Otherwise the sensor electric circuit or controller have malfunction

- Some of indoor unit haven't display the troubleshooting or processing of malfunction;

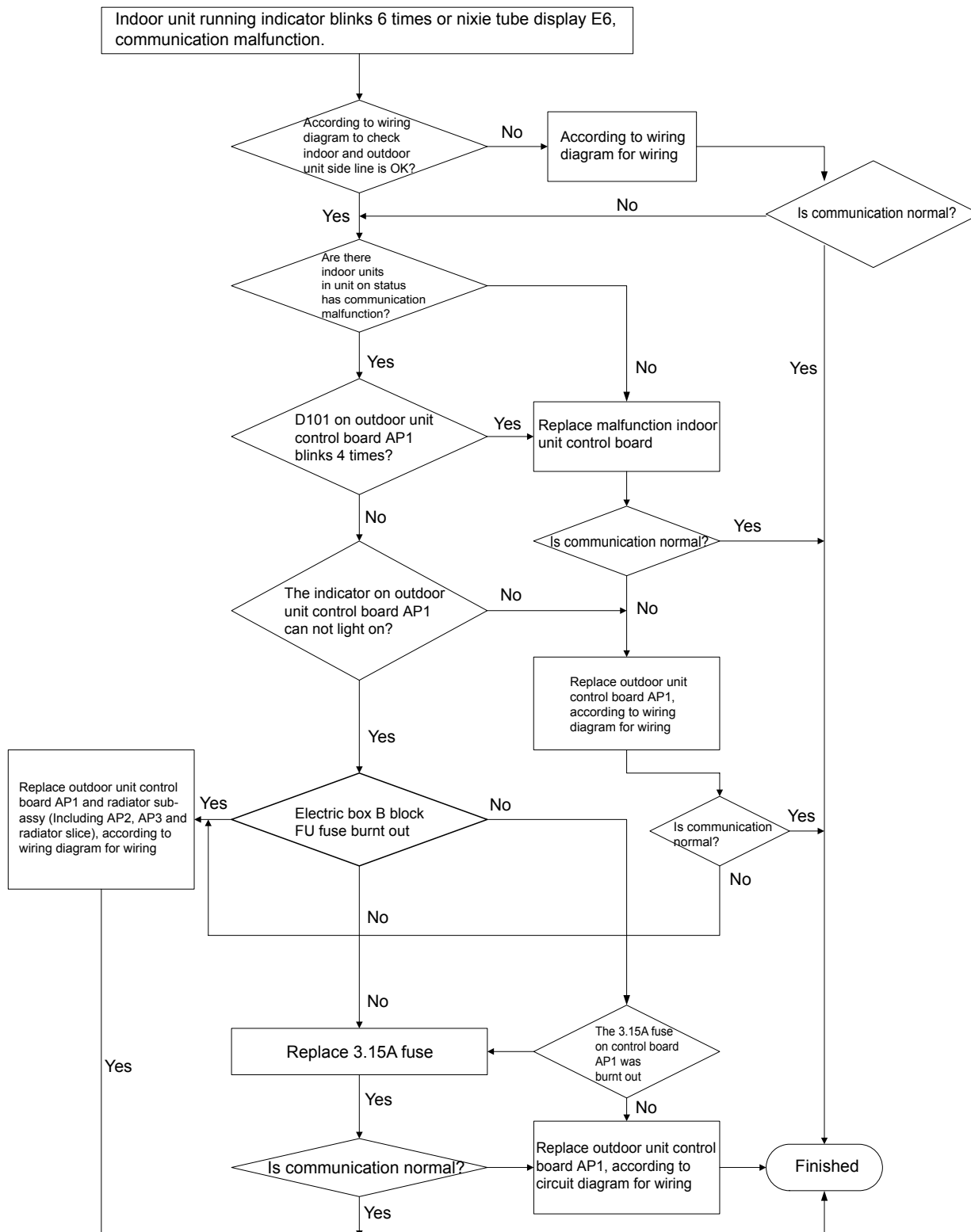
Start up failure

- Malfunction and phenomenon: After unit is turned on, indoor and outdoor units normally run, but there is no cooling or heating, observe module of outdoor unit and discover the malfunction indicator firstly blinks 7 times, after start up for many times later, the malfunction indicator blinks 6 times.

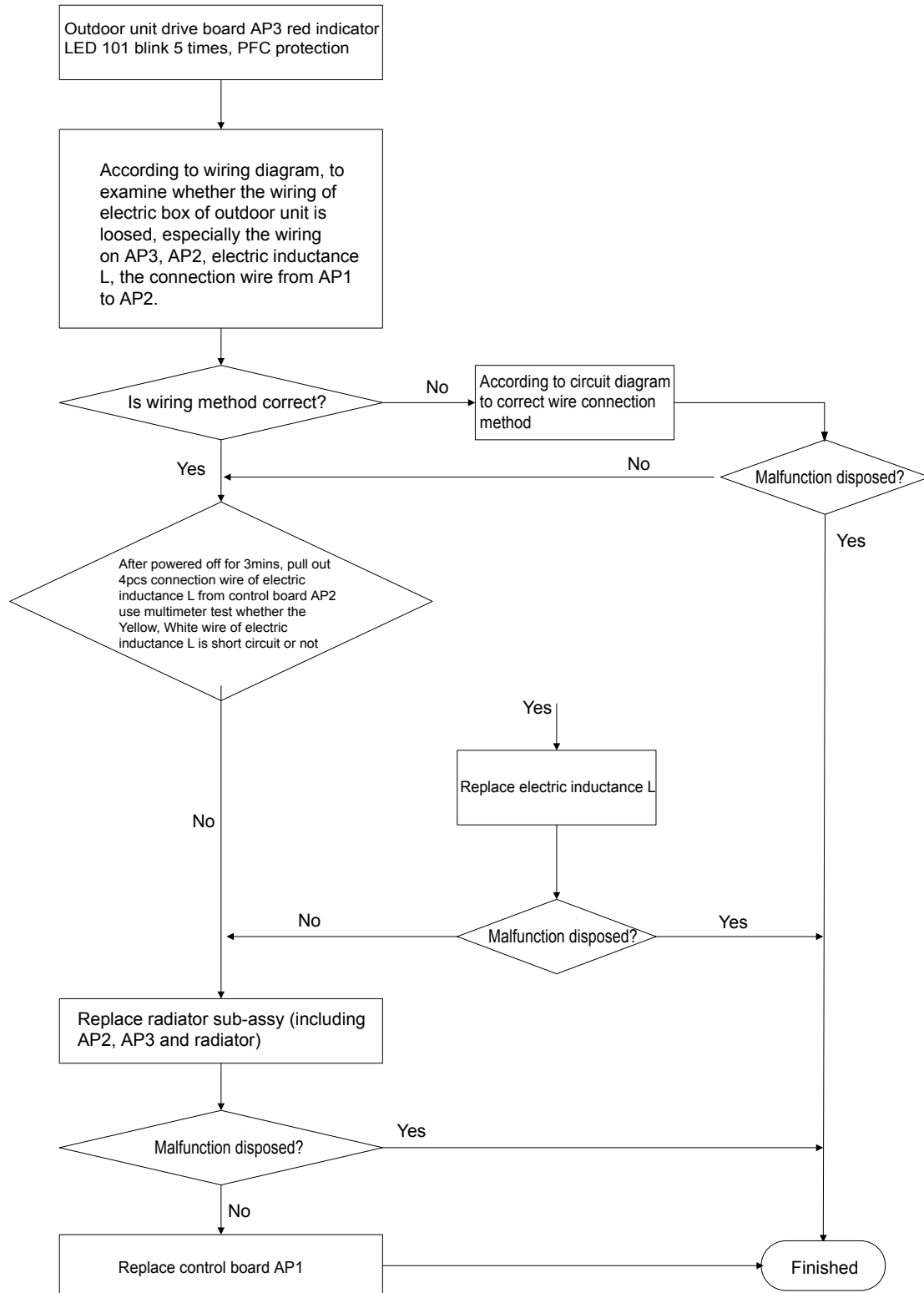
- Processing method:

-
- A. Examine whether the compressor wiring is firmed or not;
B. Check whether the compressor has malfunction or not, refer to the prior testing method of module protection;
C. Replace a new drive board, if it normally starts up, that is the power module electric circuit malfunction.
- Communication malfunction of outdoor unit main board and power module
- Malfunction phenomenon: outdoor unit main board D104 indicator blinks 4 times or power module malfunction indicator (Green) ever light on.
 - Processing method:
- A. Check whether is there any problem between outdoor main board and 5-core wire of power module;
B. Replace one new power module and outdoor mainboard communication, malfunction resumes that is the power module problem; Otherwise it is the outdoor mainboard problem, replace error controller.
DC current power short circuit
- Malfunction phenomenon: Outdoor unit main board malfunction indicator D101 blinks 15 times.
 - Malfunction reason: PFC module (IPM module) short circuit in PN or the PFC electric inductance short circuit cause the unsuccessful of capacity charge when starting.
 - Processing method: Check whether the circuit is normal or not on the outdoor unit mainboard, (mostly the concrete resistance and main relay), examine the PFC module, IPM module or the short circuit caused by PFC electric inductance, (pls refer to the checking method of prior module protection and PFC protection), replace the corresponding controller or PFC electric inductance.
-

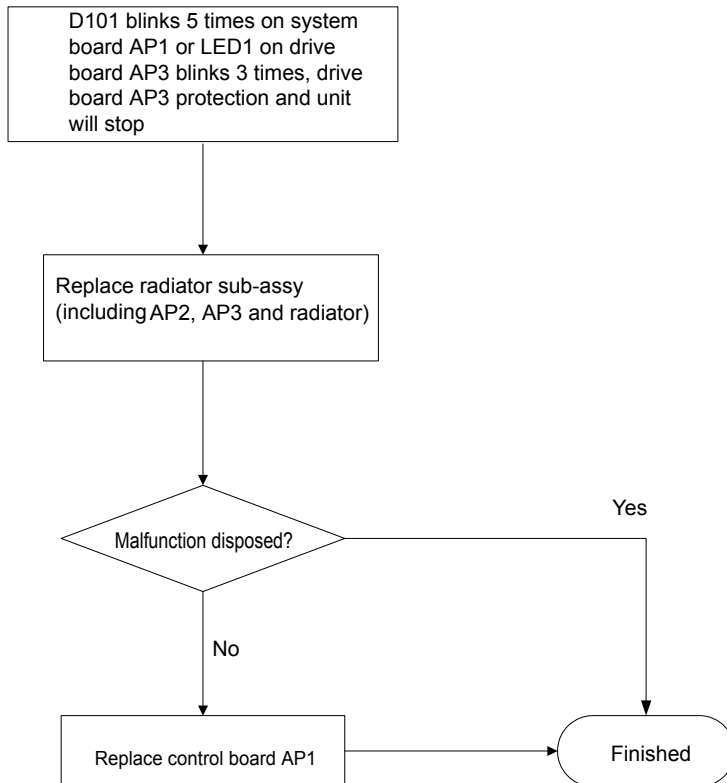
1. Indoor unit red indicator blinks 6 times, communication malfunction analysis



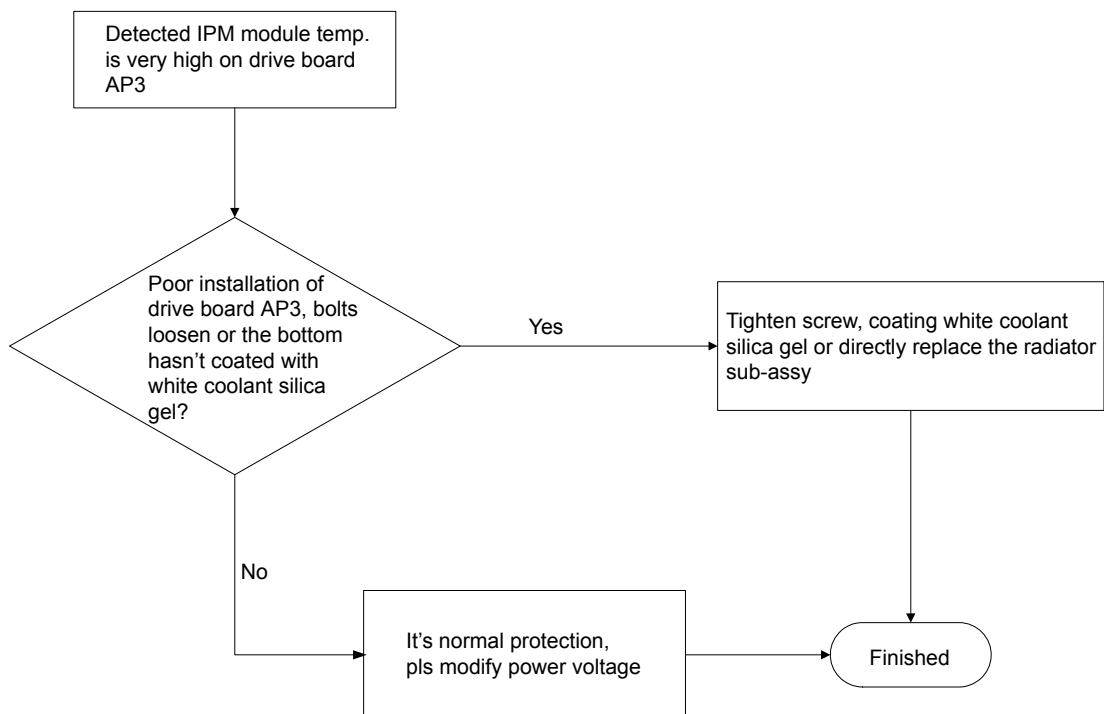
2. The red indicator LED101 blinks 5 times on the outdoor unit drive board AP3,
PFC protection analysis



-
3. D101 blinks 5 times on the system board AP1 or LED1 on drive board AP3 blinks 3 times, T1 drive module protection analysis



4. LED1 on drive board AP3 blinks 10 times, detected IPM module temp. is very high on APS, the unit will stop





PARTS GUIDE

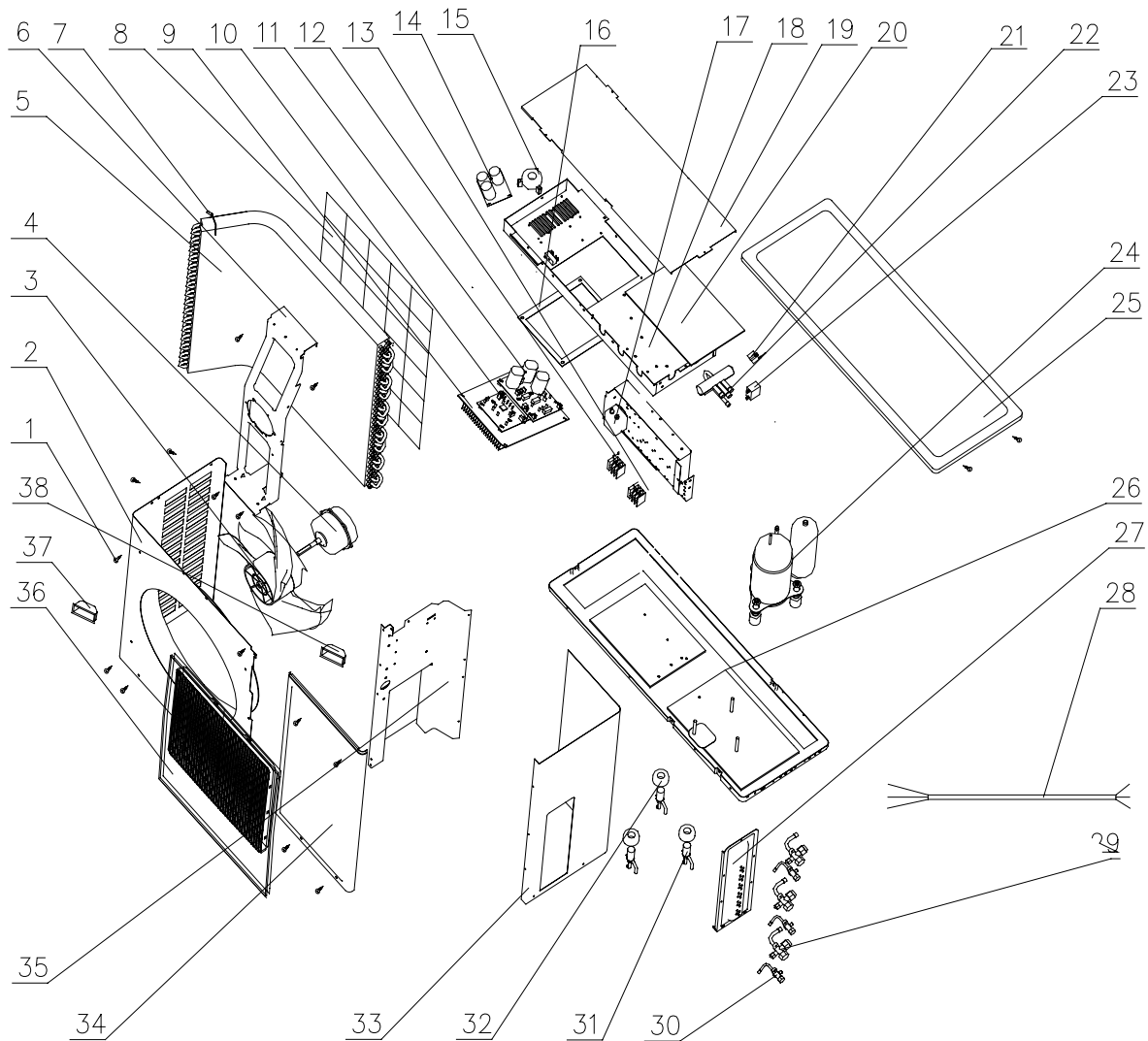
FREE COMBI SERIE

FC-E24AI, FC-E28AI



7.Exploded View and Replacement Parts List

1.FC-E24AI

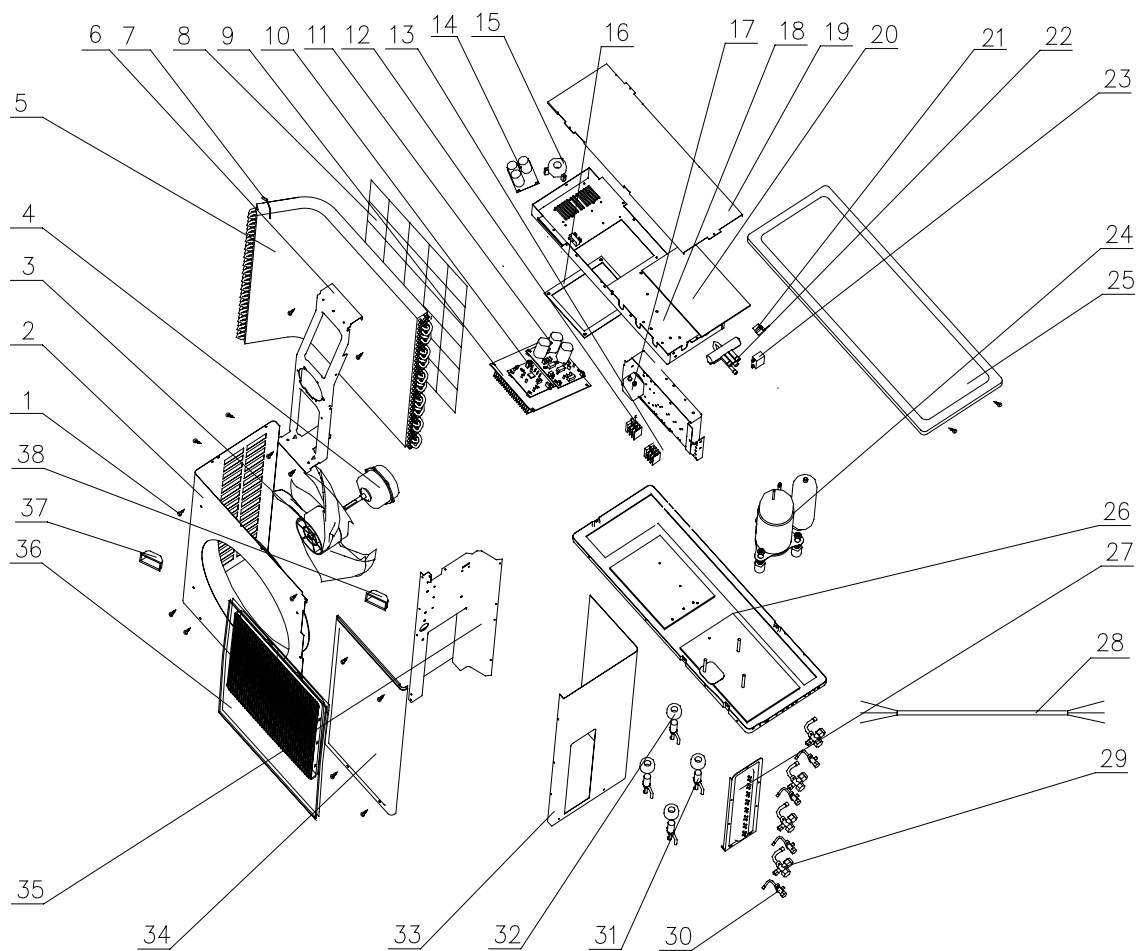


Parts List

No	Description	Part Code	Qty
		FC-E24E	
1	Self-tapping Screw	70140561	72
2	Front plate	01433011	1
3	Axial Flow Fan	10335253	1
4	Motor FW60K	15013502	1
5	Condenser Assy	01133493	1
6	Motor Support	01705007	1
7	Ambient Sensor	3900028001	1
8	Rear Grill	01475252	1
9	Radiator	49013013	1
10	Power Module DY82A	32210057	1
11	PFC Module JGP011A	30111019	1
12	Terminal Board RS9413G	42010178	1
13	Terminal Board RS9413	420111041	3
14	Power Module DY82PFC	32210058	1
15	Reactor LO.275uH+275uH/40A	43120022	1
16	Module Bracket	24213007	1
17	Filter FN2030-30-08	43130020	1
18	Electric Plate	01403866	1
19	Electric Plate cover	01413108	1
20	Main PCB	30038219	1
21	4-Way Valve Coil 1	430004002	1
22	4-Way Valve	43000411	1
23	Capacitor CBB611A 3UF/450V	33010027	1
24	compressor	00105204	1
25	Top Cover Assy	012552621	1
26	Metal Base Assy	01203642	1
27	Valve Support	01713044	1
28	Power cable	400205405	1
29	Valve Assy 3/8"	07130209	3
30	Valve Assy 1/4"	07130208	3
31	Electronic Expansion Valve	07130358	3
32	Electronic Expansion Loop	43000109	3
33	Rear Side Plate	01303007	1
34	Front Side Plate	01305018	1
35	Isolation Sheet	0123303901	1
36	Front Grill	01473001	1
37	Handle	26235253	2
38	Left Handle	26235401	1

Note: The above data are subject to be changed without notice.

2.FC-E28AI



Parts List

No	Description	Part Code	Qty
		FC-E28AI	
1	Self-tapping Screw	70140561	72
2	Front plate	01433011	1
3	Axial Flow Fan	10335253	1
4	Motor FW60K	15013502	1
5	Condenser Assy	01133493	1
6	Motor Support	01705007	1
7	Ambient Sensor	3900028001	1
8	Rear Grill	01475252	1
9	Radiator	49013013	1
10	Power Module DY82A	32210057	1
11	PFC Module JGP011A	30111019	1
12	Terminal Board RS9413G	42010178	1
13	Terminal Board RS9413	420111041	4
14	Power Module DY82PFC	32210058	1
15	Reactor LO.275uH+275uH/40A	43120022	1
16	Module Bracket	24213007	1
17	Filter FN2030-30-08	43130020	1
18	Electric Plate	01413866	1
19	Electric Plate cover	01413108	1
20	Main PCB	30038219	1
21	4-Way Valve Coil 1	430004002	1
22	4-Way Valve	43000411	1
23	Capacitor CBB611A 3UF/450V	33010027	1
24	compressor	00105204	1
25	Top Cover Assy	012552621	1
26	Metal Base Assy	01203642	1
27	Valve Support	01713035	1
28	Power cable	400205405	1
29	Valve Assy 3/8"	07130209	4
30	Valve Assy 1/4"	07130208	4
31	Electronic Expansion Valve	07130358	4
32	Electronic Expansion Loop	43000109	4
33	Rear Side Plate	01303007	1
34	Front Side Plate	01305018	1
35	Isolation Sheet	0123303901	1
36	Front Grill	01473001	1
37	Handle	26235253	2
38	Left Handle	26235401	1

Note: The above data are subject to be changed without notice.